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**1.0 GENERAL INFORMATION**

The Sacramento Municipal Utility District (the District) is submitting this License Termination Plan (LTP) for Rancho Seco Nuclear Generating Station (Rancho Seco). The following provides the licensee name, address, license number, and docket number for Rancho Seco:

Sacramento Municipal Utility District  
Rancho Seco Nuclear Generating Station  
14440 Twin Cities Road  
Herald, CA 95638  
License No. DPR-54  
Docket No. 50-312

All of the Rancho Seco spent nuclear fuel is stored in the:

Rancho Seco Independent Spent Fuel Storage Installation (ISFSI)  
14440 Twin Cities Road  
Herald, CA 95638  
License No. SNM-2510  
Docket No. 72-11

**1.1. Purpose**

The objective of decommissioning Rancho Seco is to reduce the level of residual radioactivity to levels that permit the release of the site for unrestricted use and allow for the termination of the 10 CFR Part 50 license. The Rancho Seco LTP satisfies the requirement in 10 CFR 50.82(a)(9) to submit an LTP for Nuclear Regulatory Commission (NRC) approval. The LTP is a supplement to the Rancho Seco Defueled Safety Analysis Report (DSAR) and is accompanied by a proposed license amendment that establishes the criteria for when changes to the LTP require prior NRC approval.

**1.2. Scope**

The District prepared the LTP using the guidance in:

- Regulatory Guide 1.179 “Standard Format and Contents for License Termination Plans for Nuclear Power Reactors,” [Reference 1-1],
- NUREG-1575 “Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM),” [Reference 1-2],
- NUREG-1700 “Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans,” [Reference 1-3], and
- NUREG-1757 “Consolidated NMSS Decommissioning Guidance.” [Reference 1-4]

The LTP includes a discussion on the following:

- Site Characterization to ensure that final status surveys (FSS) cover all areas where contamination existed, remains, or has the potential to exist or remain,
- Identification of remaining dismantlement activities,

- Plans for site remediation,
- A description of the FSS plan to confirm that the plant and site will meet the release criteria in 10 CFR Part 20, Appendix E,
- Dose modeling scenarios that ensure compliance with the radiological criteria for license termination,
- An estimate of the remaining site-specific decommissioning costs, and
- A supplement to the environmental report describing any new information or significant environmental change, since the submittal of the Supplement to Rancho Seco Environmental Report - Post Operating License Stage, associated with proposed license termination activities.

Section 1.5 discusses the purpose and content of each LTP chapter. Section 1.6 discusses the process for making changes to the LTP.

### **1.3. Historical Background and Site Description**

#### **1.3.1 Historical Background**

Rancho Seco was a 913-MWe pressurized water reactor (PWR) designed by Babcock and Wilcox Company. The District shut down Rancho Seco permanently on June 7, 1989 after approximately 15 years of operation. On August 29, 1989, the District formally notified the NRC that the plant was shut down permanently.

On May 20, 1991, the District submitted the Rancho Seco Decommissioning Plan and on March 20, 1995, the NRC issued an Order approving the Decommissioning Plan and authorizing the decommissioning of Rancho Seco. In March 1997, the District submitted its Post Shutdown Decommissioning Activities Report (PSDAR), in accordance with 10 CFR 50.82. The PSDAR superseded the original Decommissioning Plan and provided the information required by 10 CFR 50.82(a)(4).

The District began actively decommissioning Rancho Seco in February 1997, and completed the transfer of all of the spent nuclear fuel to the 10 CFR Part 72 ISFSI on August 21, 2002. Accordingly, the only quality-related structures, systems, or components (SSCs) at the Rancho Seco 10 CFR Part 50 licensed site are the radioactive sources used to calibrate the instrumentation used to measure radioactivity in gaseous and liquid effluents. Plant dismantlement is substantially complete and most of the SSCs that *were* safety-related or important-to-safety have been removed from the plant and shipped for disposal.

#### **1.3.2 Site Description**

The Rancho Seco site is located in the southeast part of Sacramento County, California. It lies either wholly or partly within Sections 27, 28, 29, 32, 33, and 34 of Township 6 North, Range 8E. The site is approximately 26 miles north-northeast of Stockton and 25 miles southeast of Sacramento. The Rancho Seco nuclear reactor unit and ISFSI lie wholly within Section 29.

More generally, the site is located between the Sierra Nevadas to the east and the Coast Range along the Pacific Ocean to the west in an area of flat to lightly rolling terrain at an elevation of approximately 200 feet above mean sea level. To the east of the site the land becomes more

rolling, rising to an elevation of 600 feet at a distance of about seven miles, and increasing in elevation thereafter approaching the Sierra Nevada foothills.

The area surrounding the site is almost exclusively agricultural and is presently used as grazing land and more recently for growing grapes. The climatology of the Rancho Seco site is typical of the Great Central Valley of California. Cloudless skies prevail during summer and much of the spring and fall. The rainy season usually extends from December through March.

The owner-controlled site is approximately 2,480 acres with all acreage being owned by the District. Within the owner-controlled area is an approximately 87-acre fence-enclosed Industrial Area containing the nuclear facility. A 30-acre natural gas-fired power plant is located approximately ½ mile south of the Industrial Area boundary. Also within the 2,480-acre site are:

- The 560-acre Rancho Seco Reservoir and Recreation Area,
- A 50-acre solar power (photo-voltaic) electrical generating station,
- The 10-acre, 10 CFR Part 72 licensed ISFSI<sup>1</sup>, and
- An emergency backup data center (located within the Industrial Area) used to recover critical computer applications and data if a serious incident or disaster disables data servers at District headquarters in Sacramento.
- The District back up control center (located within the Industrial Area), which is used to control the District's electrical system in the event that the control facility at District headquarters needs to be evacuated.

Groundwater in the site area occurs under free or semi-confined conditions. Groundwater movement in the area is to the southwest with a slope of about ten feet/mile.

There is no indication of faulting beneath the site. The nearest fault system, the Foothill Fault System, is about ten miles east of the site and has been inactive since the Jurassic Period, some 135 million years ago. Ground accelerations of no greater than 0.05g are anticipated at the site.

The soils at the Rancho Seco site can be categorized as hard to very hard silts and silty clays with dense to very dense sands and gravels.

#### **1.4. Decommissioning Approach**

##### **1.4.1 Overview**

The objective of decommissioning Rancho Seco is to reduce the level of residual radioactivity to levels that permit the use of the site for unrestricted use and allow for the termination of the 10 CFR Part 50 license. Decommissioning involves the systematic removal of SSCs that comprise the radioactive portions of the site. The District conducts decommissioning activities in accordance with the NRC's Decommissioning Rule, the Rancho Seco 10 CFR Part 50 license, plant Licensing Basis Documents, and approved procedures.

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<sup>1</sup> The 10 CFR Part 72 licensed ISFSI is independent of the 10 CFR Part 50 licensed facility.

After SSCs are removed, they are surveyed to determine the contamination level. Non-contaminated material is free-released for asset recovery, recycling, or disposal at an offsite landfill. Contaminated material may be released as non-contaminated material after decontamination, shipped to a licensed offsite processor for disposition, or shipped to an offsite low-level waste (LLW) disposal site (i.e., EnergySolutions<sup>2</sup>).

Radioactive waste handlers package LLW for transport and disposal in accordance with applicable NRC and Department of Transportation (DOT) regulatory requirements. Radioactive waste that does not currently have an acceptable disposal option (i.e., waste Class B & C and greater than class C (GTCC) waste) will be stored onsite until a disposal option acceptable to the District becomes available.

Rancho Seco continues to implement its Radiological Controls Program. The objectives of the Radiological Controls Program are to control radiation hazards, avoid accidental radiation exposures, maintain worker Total Effective Dose Equivalent (TEDE) to less than 5 rem/year, and maintain doses to workers and the public As Low As Reasonably Achievable (ALARA). The philosophies, policies, and objectives of the Radiological Controls Program are based on federal regulations and associated regulatory guidance.

The Rancho Seco ALARA program is implemented in accordance with the requirements of 10 CFR Part 20 and additional NRC regulatory guidance. The ALARA policy states management's commitment to maintain exposures to workers and the public ALARA. This commitment is contained in the DSAR and is implemented by plant administrative procedures and Radiation Protection Department implementing procedures.

The integrated approach to decommissioning includes support from the Radiation Protection, Quality Assurance, Engineering, Maintenance, Licensing, and Decommissioning organizations and outside contractors, as required to complete the project. The Decommissioning organization provides project management and has developed administrative procedures to implement decommissioning activities. Additionally, staff uses existing plant programs and procedures to implement various aspects of the decommissioning project.

The use of trained individuals, adherence to approved procedures and established institutional controls, will ensure that the risk to the public and worker health and safety is minimal. Risks associated with the transportation of LLW are also minimal.

The environmental assessment, discussed in Chapter 8 of this LTP, determined that the environmental effects from decommissioning of Rancho Seco are minimal, and there are no adverse effects outside the bounds of NUREG-0586 "Final Generic Environmental Impact Statement (GEIS) on Decommissioning of Nuclear Facilities," [Reference 1-5]. Additionally the conclusions contained in the Supplement to Rancho Seco Environmental Report - Post Operating License Stage, used as the original basis for the environmental assessment of radiological and non-radiological effects of decommissioning, are still valid.

The District's dose modeling objective is to develop Derived Concentration Guideline Levels (DCGLs) that will demonstrate compliance with the dose-based release criteria. The District will then demonstrate through the FSS that the levels of residual radioactivity at the site are equal to or below the DCGLs (i.e., below the dose-based release criteria) with a pre-specified degree of confidence.

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<sup>2</sup> EnergySolutions was previously Envirocare of Utah

### **1.4.2 Approach to License Termination**

The District intends to release the Rancho Seco site for unrestricted use in two phases, with the license terminated after completion of the second phase. The first phase includes the majority of the site, including impacted and non-impacted areas, except for the Interim Onsite Storage Building (IOSB). In general, each location will be released after the completion of the associated final status surveys. Once an area has been verified as ready for release, no additional surveys or decontamination of the subject area will be required unless the controls (e.g., administrative or engineered) established to prevent re-contamination have been compromised.

Following completion of an FSS for a given survey unit, Rancho Seco staff will develop an FSS Report to document the final radiological condition of the area and demonstrate that the criteria in 10 CFR 20.1402 are met. These reports will be compiled and submitted to the NRC. Following the completion and acceptance of the FSS Reports for the first phase, the District will submit a license amendment request to release the first portion of the site for unrestricted use.

Since there is currently no disposal site for Class B & C radioactive waste that is acceptable to the District, the District will continue to store this waste in the IOSB<sup>3</sup>. After disposing of the Class B & C radioactive waste when an acceptable disposition option becomes available, the District will complete the FSS for the second phase (i.e., the IOSB) and submit a license amendment request to release the remainder of the site and terminate the 10 CFR Part 50 license.

Chapter 5 of this LTP, Final Status Survey Plan, describes the contents of the FSS Report.

The spent nuclear fuel and the GTCC waste will remain in storage at the ISFSI until the Department of Energy (DOE) transfers this waste to a federal repository.

## **1.5. Plan Summary**

### **1.5.1 General Information**

The Rancho Seco LTP describes the process used to meet the requirements for terminating the Rancho Seco 10 CFR Part 50 license and release the site for unrestricted use. The LTP has been prepared in accordance with the requirements in 10 CFR 50.82(a)(9) and is submitted as a supplement to the Rancho Seco DSAR. The LTP submittal is accompanied by a proposed license amendment that establishes the criteria for when changes to the LTP require prior NRC approval.

The subsections below provide a brief summary of the seven chapters that address the requirements in 10 CFR 50.82(a)(9).

### **1.5.2 Site Characterization**

LTP Chapter 2 discusses the site characterization that has been conducted to determine the extent and range of radioactive contamination on site prior to remediation, including remaining structures, soils, and surface and ground water at Rancho Seco. Based on the results of the site characterization, Rancho Seco staff will plan remediation and FSSs in impacted areas.

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<sup>3</sup> The IOSB may also be used to store materials other than Class B and C radioactive waste.

The District also used the information gathered during site characterization to develop site-specific input into the dose modeling.

The Historical Site Assessment (HSA) provided the foundation for further site characterization. The HSA provided the preliminary information required to divide the site into survey units. The survey units were evaluated against the criteria specified in the MARSSIM guidelines for classification. Data from subsequent characterization may be used to change the original classification of an area, within the requirements of this LTP, up to the time of the FSS, as long as the classification reflects the level of residual activity existing prior to any remediation in the area.

### **1.5.3 Identification of Remaining Site Dismantlement Activities**

LTP Chapter 3 identifies the remaining site dismantlement and decontamination activities. The information provided in Chapter 3 includes:

- A description of the areas and equipment that need further remediation,
- A characterization of radiological conditions that may be encountered,
- Estimates of associated occupational radiation dose,
- An estimate of the types and quantities of radioactive material to be released in accordance with 10 CFR 20.2001, and
- A description of proposed control mechanisms to ensure areas are not re-contaminated.

The District is decommissioning Rancho Seco in accordance with the DECON alternative described in NUREG-0586. Completion of the DECON option is contingent upon access to a LLW disposal site. Rancho Seco currently has access to the disposal facilities of EnergySolutions, which currently accepts only Class A radioactive waste.

Decommissioning activities are conducted in accordance with the Rancho Seco Radiation Protection Program, Radwaste Manual, Off-Site Dose Calculation Manual (ODCM), Safety Program, and plant administrative procedures. These are established programs that are routinely inspected by the NRC.

Activities conducted during decommissioning do not pose any greater radiological or safety risk than those conducted during plant operations. The radiological risk associated with decommissioning activities is bounded by previously analyzed radiological risk for former operating activities that occurred during major maintenance and outage evolutions.

The information contained in Chapter 3 supports the assessment of impacts considered in other sections of the LTP and provides sufficient detail to identify resources needed during the remaining dismantlement activities.

### **1.5.4 Site Remediation Plans**

LTP Chapter 4 discusses the various remediation techniques that may be used during decommissioning to reduce residual contamination to levels that comply with the release criteria in 10 CFR 20.1402. LTP Chapter 4 also discusses the ALARA evaluation and the Radiation Protection Program requirements that will be implemented during the remediation process.



The remediation method used is dependent on the contaminated material. The principal materials that may be subjected to remediation are structural surfaces and soils. LTP Appendix 4-A describes the equipment, personnel, and waste costs used to generate a unit cost basis for the various remediation actions that may be used.

Following the removal of equipment and components, structures will be surveyed and decontaminated, as necessary. Remediation techniques that may be used for structural surfaces include washing, wiping, pressure washing, vacuuming, scabbling, chipping, and sponge or abrasive blasting. Washing, wiping, abrasive blasting, vacuuming and pressure washing techniques may be used for both metal and concrete surfaces. Scabbling and chipping are mechanical surface removal methods that are intended for concrete surfaces. Activated concrete removal may include using machines with hydraulic-assisted, remote-operated, articulating tools. These machines have the ability to exchange scabbling, shear, chisel and other tool heads.

Soil contamination above the site-specific DCGL will be removed and disposed of as radioactive waste. Operational constraints and dust control will be addressed in site excavation and soil control procedures. Soil remediation equipment will include, but not be limited to, back and track hoe excavators. As practical, when the remediation depth approaches the soil interface region for unacceptable and acceptable contamination, a squared edge excavator bucket design or similar technique may be used. This simple methodology minimizes the mixing of contaminated soils with acceptable lower soil layers as would occur with a toothed excavator bucket. Remediation of soils will include the use of established excavation safety and environmental control procedures. Additionally, soil handling procedures and work package instructions will augment the above guidance and procedural requirements to ensure adequate erosion, sediment, and air emission controls during soil remediation.

The Radiation Protection Program implemented during decommissioning is similar to the program that was in place during commercial power operation. Decommissioning does not present any new challenge to the Radiation Protection Program and the existing program is adequate to safely control the radiological aspects of remediation activities.

### **1.5.5 Final Status Survey Plan**

LTP Chapter 5 discusses the Final Status Survey Plan. The FSS Plan has been prepared using applicable regulatory and industry guidance. This plan will be used to develop site procedures and work instructions to perform the FSS of the Rancho Seco site.

The FSS Plan describes the final survey process used to demonstrate that the Rancho Seco facility and site complies with radiological criteria for unrestricted use specified in 10 CFR 20.1402 (i.e., annual dose limit of 25 mrem plus ALARA for all dose pathways). NRC regulations applicable to radiation surveys are found in 10 CFR 50.82(a)(9)(ii)(D) and 10 CFR 20.1501(a) and (b).

The FSS Plan describes the development of the survey plan, survey design and data quality objectives, survey methods and instrumentation, data collection and processing, data assessment and compliance, and the Quality Assurance Project Plan (QAPP). This FSS Plan address only facilities and land areas that are identified as contaminated or potentially contaminated (impacted) resulting from activities associated with commercial nuclear plant operation.

As discussed above, the District intends to release the site in two phases. The first phase includes the majority of the site and remaining structures. The second phase of site release includes the IOSB following the disposal of Class B and C radioactive waste. The FSS Plan addresses requirements applicable to the first phase of site release and may also be used during the second phase to release the IOSB.

The ISFSI, licensed under 10 CFR Part 72, is not subject to the conditions of this LTP.

#### **1.5.6 Compliance with the Radiological Criteria for License Termination**

LTP Chapter 6, along with Chapters 4 & 5, describes the methods used to demonstrate compliance with the radiological criteria for license termination and release of the site for unrestricted use. Chapter 6 discusses the site-specific inventory of radionuclides, future land use scenarios, exposure pathways, computational models used for dose modeling, sensitivity analysis, DCGLs, the derivation of area factors, and a comparison of alternative exposure scenarios for impacted area soils.

The District intends on maintaining ownership of the 2,480 acre Rancho Seco site. Accordingly, dose modeling is based on the Industrial Worker scenario. Chapter 6 provides justification for using this scenario.

#### **1.5.7 Update of Site-Specific Decommissioning Costs**

LTP Chapter 7 provides an estimate of the remaining decommissioning costs for releasing the site for unrestricted use. This chapter also compares the estimated remaining cost with the funds currently available in the decommissioning trust fund.

The current annual trust fund contribution is \$27 million, which is expected to remain the same through 2008, at which time there should be sufficient funds to complete the remaining decommissioning activities.

#### **1.5.8 Supplement to the Environmental Report**

LTP Chapter 8 updates the environmental report for Rancho Seco with new information and any significant environmental impacts associated with the site's decommissioning and license termination activities. This section of the LTP is prepared pursuant to 10 CFR 51.53(d) and 10 CFR 50.82(a)(9)(ii)(G).

In accordance with 10 CFR 51.53(d), the District submitted the Supplement to Rancho Seco Environmental Report - Post Operating License Stage along with the original Decommissioning Plan in 1991. This Environmental Report addressed the actual or potential environmental impacts associated with Custodial and Hardened-SAFSTOR, and provided an initial assessment of the effects of Deferred-DECON.

The Supplement to Rancho Seco Environmental Report - Post Operating License Stage compared Rancho Seco decommissioning attributes to those identified in NUREG-0586. NUREG-0586 provides a generic environmental assessment of decommissioning a reference nuclear facility. When the NRC issued the Decommissioning Rule in 1988, and based on the findings in the GEIS, it concluded a generic finding of "no significant (environmental) impact." The NRC further concluded that no additional Environmental Impact Statement would need to be prepared in connection with the decommissioning of a particular nuclear site unless the

impacts of a particular plant have site-specific considerations significantly different from those studied generically. The Supplement to Rancho Seco Environmental Report - Post Operating License Stage concludes that Rancho Seco falls within the envelope of the GEIS.

Additionally, in accordance with the California Environmental Quality Act (CEQA), the District conducted an initial study of the potential environmental impacts resulting from closing and decommissioning Rancho Seco. Based on the results of that study, the District staff prepared a Negative Declaration stating that decommissioning would not have a significant environmental impact.

In February 1997, the District began dismantlement activities at Rancho Seco, with the goal of terminating the 10 CFR Part 50 license by 2008. Prior to beginning dismantlement activities, the District conducted another evaluation under CEQA and again concluded that decommissioning would not have a significant environmental impact.

In March 1997 the District submitted its PSDAR, in accordance with 10 CFR 50.82. The PSDAR superseded the original Decommissioning Plan and provided the information required by 10 CFR 50.82(a)(4). PSDAR Section 4, "Environmental Review," provides a discussion of the environmental impacts associated with site-specific decommissioning activities and concluded that all of the decommissioning attributes identified for Rancho Seco are within the envelop of NUREG-0586, except for the decommissioning cost estimate, which is not directly comparable.

The environmental assessment determined that the environmental effects for decommissioning Rancho Seco are minimal, and there are no adverse effects outside the bounds of NUREG-0586 or the associated Supplement 1. Additionally, the conclusions contained in the Supplement to Rancho Seco Environmental Report - Post Operating License Stage, used as the original basis for the decommissioning environmental assessment of radiological and non-radiological effects of decommissioning, are still valid.

#### **1.6. License Termination Plan Change Process**

The District is submitting the LTP as a supplement to the DSAR. Accordingly, the District will update the LTP in accordance with 10 CFR 50.71(e). Once approved, the District may make changes to the LTP, without prior NRC approval, in accordance with the criteria in 10 CFR 50.59, 10 CFR 50.82(a)(6), and 10 CFR 50.82(a)(7).

The District also submitted a proposed amendment to the Rancho Seco Operating License that adds a license condition that establishes the criteria for determining when changes to the LTP require prior NRC approval. Changes to the LTP require prior NRC approval when the change:

- Increases the probability of making a Type I decision error above the level stated in the LTP,
- Increases the radionuclide-specific DCGLs,
- Increases the radioactivity level, relative to the applicable DCGL, at which investigation occurs, and
- Changes the statistical test applied other than the Sign Test or Wilcoxon Rank Sum Test.

Re-classification of survey areas from a less to a more restrictive classification (e.g., from a Class 3 to a Class 2 area) may be done without prior NRC notification; however, re-classification to a less restrictive classification (e.g., Class 1 to Class 2 area) will require NRC notification at least 14 days prior implementation.

**1.7. License Termination Plan Information Contact**

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**1.8. References**

- 1-1 U.S. Nuclear Regulatory Commission Regulatory Guide 1.179 "Standard Format and Contents for License Termination Plans for Nuclear Power Reactors"
- 1-2 U.S. Nuclear Regulatory Commission NUREG-1575 "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)"
- 1-3 U.S. Nuclear Regulatory Commission NUREG-1700 "Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans"
- 1-4 U.S. Nuclear Regulatory Commission NUREG-1757 "Consolidated NMSS Decommissioning Guidance"
- 1-5 U.S. Nuclear Regulatory Commission NUREG-0586 "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities."